

National Atmospheric Deposition Program 2019 Calendar

NADP Summary

The National Atmospheric Deposition Program (NADP) is a Cooperative Research Support Program of the State Agricultural Experiment Stations (NRSP-3), housed at the Wisconsin State Laboratory of Hygiene at the University of Wisconsin-Madison, and is based on collaborative efforts between many different groups interested in atmospheric deposition of pollutants and their effects on different environments. It is structured as a cooperative program that represents coordinated efforts of many individuals in federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies to operate monitoring sites and report data. The NADP provides free and easy access to all of its precipitation data, including seasonal and annual averages, trend plots, deposition maps, reports, manuals, and educational brochures.



The NADP Program Office is located at the Wisconsin State Laboratory of Hygiene, a unit of the University of Wisconsin-Madison. For more information, contact: NADP Program Office, Wisconsin State Laboratory of Hygiene, 465 Henry Mall, Madison, Wisconsin 53706; E-mail: nadp@slh.wisc.edu; or visit http://nadp.slh.wisc.edu.



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(CAL)

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Eurofins Frontier Global Sciences, Inc. 11720 North Creek Parkway N, Suite 400 Bothell, Washington 98011

NADP Transition News

The NADP Program Office (PO) and Central Analytical Lab (CAL) have moved from the University of Illinois to their new home at the Wisconsin State Laboratory of Hygiene (WSLH) at the University of Wisconsin-Madison. The Program Office moved to the WSLH on March 1, 2018 and the CAL followed on June 1, 2018.





Wisconsin State Laboratory of Hygiene

465 Henry Mall









Wisconsin State Laboratory of Hygiene

2601 Agriculture Drive









Staff



Front row from left: Mark Olson, Richard Tanabe, Nichole Davis, Claudia Yan, Chris Gunter Middle row from left: Bob Larson, Muge Kafadar, Mike Olson Back row from left: Nathaniel Javid, Tyler Trickle, David Gay

Staff



Front row from left: Katie Blaydes, Maisie Steinbrink, Camille Danielson Middle row from left: Marie Assem, Kirsten Widmayer, April Grant Back row from left: Megan Steele, Chris Worley, Jesse Wouters, Amy Mager

Notes from the Chair

The year 2019 signifies a milestone for NADP - our first full year of operation by the new Program Office and Central Analytical Laboratory based at the Wisconsin State Laboratory of Hygiene in Madison! This upcoming year also marks NADP's 41st anniversary - one of the most successful environmental monitoring programs in the world. Many thanks to you - our site operators - for the work you do to keep our monitoring activities running smoothly year round.

Sincerely,

Doug Burns

Douglas A. Burns Chair of the Executive Committee



Mercury Deposition Network site 102 at Biscuit Brook in the Catskill Mountains of New York.



The NADP Chair collects a water sample at Fishing Brook near the NY20 National Trends Network site.

National Trends Network (NTN)

The NTN is a nationwide network of sites that collect precipitation data for use in characterizing the geographic distribution and annual trends of chemical wet deposition.

Established: 1977

First sample collected: July 1978

Original 7 sites: MN16, NC25, NE15, NH02, PA29, VA13, and WV18

Number of sites: Approximately 270

Frequency: Weekly





Technology: Precipitation collector and raingage

Measures: Free acidity (H as pH), specific conductance, calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO₄), nitrate (NO₃), chloride (Cl), bromide (Br), and ammonium (NH₄). The CAL also measures orthophosphate, but only for quality assurance as an indicator of sample contamination.

January 2019

	1				-	
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		New Year's Day CAL and HAL closed NTN change-out MDN change-out	1 2	3	4	5
6	7	NTN change-out MDN change-out AMoN change-out	8 9	10	11	12
13	14	1 NTN change-out MDN change-out	5 16	17	18	19
20	21 Martin Luther King Day CAL and HAL closed	2 NTN change-out MDN change-out AMoN change-out	2 23	24	25	26
27	28	2 NTN change-out MDN change-out	9 30	31	Submit AMNet S B at the end of t	ite Reports A & he month.

National Trends Network (NTN)



Sulfate ion wet deposition, 1985





Sulfate ion wet deposition, 2017



February 2019

						J
Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
						Groundhog Day
3	4	5 NTN change-out MDN change-out AMoN change-out	6	7	8	9
10	11	12 NTN change-out MDN change-out	13	14 Valentine's Day	15	16
17	18 President's Day	19 NTN change-out MDN change-out AMoN change-out	20	21	22	23
24	25	26 NTN change-out MDN change-out	27	28	Submit AMNet S B at the end of t	ite Reports A & he month.

Mercury Deposition Network (MDN)

The MDN is the only network providing a longterm record of total mercury (Hg) concentration and deposition in precipitation in the United States and Canada. The goal of the MDN is to develop a network that adequately covers all continental ecoregions for accurate mercury determination in precipitation.

Established: January 1996

- Measures: Total mercury concentration in all precipitation samples; optional - methyl mercury concentration as a composite
- Frequency: Weekly, or event-based
- Technology: Precipitation collector and raingage
- Laboratory: Eurofins Frontier Global Sciences, Inc. in Bothell, Washington

Highest annual precipitation-weighted mean concentration: 92.7 ng/L at NV02 in 2014 Highest annual deposition: 29.1 μ g/m² at PA37 in 2011 Lowest annual precipitation-weighted mean

concentration: 1.5 ng/L at AK05 in 2011

Lowest annual deposition: 1.2 μ g/m² at NV02 in 2007





March 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5 NTN change-out MDN change-out AMoN change-out	6	7	8	9
10 Daylight Saving Time starts	11	12 NTN change-out MDN change-out	13	14	15	16
17 St. Patrick's Day	18	19 NTN change-out MDN change-out AMoN change-out	20	21	22	23
24	25	26 NTN change-out MDN change-out	27	28	29	30
31		Submit AMNet	t Site Reports A,	B, & C at the end	of the month.	·

Mercury Deposition Network (MDN)



Sites not pictured: Alaska 02 3.8 µg/m² Saskatchewan 27 4.9 µg/m²



The MDN

• Provides a nationally consistent survey of mercury wet-deposition concentrations and fluxes showing regional and international deposition patterns.

• Identifies long-term pattern changes in wetdeposition rates over time and space.

• Provides high-quality data for use in estimating wet deposition rates locally or between sites, and for current and future mercury policy and modeling efforts.

Advantages of MDN Membership

- Low operating costs.
- Input to decisions.
- High-quality data that undergo rigorous MDN quality assurance (QA).
- Access to all site data for comparison and research.
- Contributing to the international understanding of mercury in the environment.

April 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 NTN change-out MDN change-out AMoN change-out	3	4	5	6
7	8	9 NTN change-out MDN change-out	10	11	12	13
14	15	16 NTN change-out MDN change-out AMoN change-out	17	18	19	20
21 Easter	22	23 NTN change-out MDN change-out	24	25	26	27
28	29	30 NTN change-out MDN change-out AMoN change-out	Submit AMN	et Site Reports A	& B at the end o	of the month.

Ammonia Monitoring Network (AMoN)

The AMoN uses a Radiello®-passive sampler, a simple diffusion-type sampling device, for measuring 2-weekaveraged ambient ammonia concentrations. AMoN provides data necessary to determine the spatial distribution and seasonality of ammonia concentrations, providing information to assist in meeting scientific and air quality policy and management needs. Established: October 2010 Measures: Atmospheric ammonia concentration Frequency: Every 2 weeks Technology: Passive samplers Number of sites: 102



May 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Submit AMNet S the month.	ite Reports A & I	B at the end of	1	2	3	4
5	6	7 NTN change-out MDN change-out	8	9	10	11
12 Mother's Day	13	14 NTN change-out MDN change-out AMoN change-out	15	16	17	18
19	20	21 NTN change-out MDN change-out	22	23	24	25
26	27 Memorial Day CAL and HAL closed	28 NTN change-out MDN change-out AMoN change-out	29	30	31	

Ammonia Monitoring Network (AMoN)

The AMoN uses Radiello[®] passive samplers (http://www.radiello.com), which do not require electricity or a data logger. AMoN sites can be installed almost anywhere, provided the area meets the siting criteria. An example of a site setup is shown below.

Highest annual median concentration: 18.75 μ g/m³ in 2013 at UT01

Lowest annual median concentration: 0.24 $\mu g/m^3$ in 2016 at NH02

Most new sites in a single year: 25 in 2015

First sample: Collected on 11/14/2007 at MI96 (AMoN operating as a new initiative)

Samples collected: Greater than 14,000





June 2019

					, , ,	
Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4 NTN change-out MDN change-out	5	6	7	8
9	10	11 NTN change-out MDN change-out AMoN change-out	12	13	14 Flag Day	15
16 Father's Day	17	18 NTN change-out MDN change-out	19	20	21	22
23	24	25 NTN change-out MDN change-out AMoN change-out	26	27	28	29
30		Submit AMNet	t Site Reports A,	B, & C at the end	of the month.	

Atmospheric Mercury Network (AMNet)

The goal of AMNet is to monitor, summarize, and report the atmospheric concentrations of mercury species that contribute to dry and total mercury deposition across North America. AMNet provides high-resolution data used to assess the effectiveness of mercury control measures, evaluate atmospheric models, assess contributions from and impacts of mercury emitting sources on ecosystems, and determine long-term atmospheric mercury trends.



Established: October 2009

Measures: Concentration of atmospheric Gaseous elemental mercury (GEM), Gaseous oxidized mercury (GOM), and Particulate bound mercury (PBM_{2.5}) specific to each site's data needs.

Frequency: Automated, unattended, continuous measurements

Technology: Cold vapor atomic fluorescence (CVAFS)

Highest annual median GEM concentration: 2.038 ng/m³ in 2009 at UT97, based on more than 3,100 measurements

Lowest annual median GEM concentration: 1.065 ng/m³ in 2013 at VT99, based on more than 2,200 measurements



July 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 NTN change-out MDN change-out	3	4 Independence Day CAL and HAL closed	5	6
7	8	9 NTN change-out MDN change-out AMoN change-out	10	11	12	13
14	15	16 NTN change-out MDN change-out	17	18	19	20
21	22	23 NTN change-out MDN change-out AMoN change-out	24	25	26	27
28	29	30 NTN change-out MDN change-out	31	Submit AMNet S the month.	ite Reports A & I	B at the end of

Atmospheric Integrated Research Monitoring Network (AIRMoN)

The AIRMoN measures the same analytes in precipitation as the NTN, but measurements are designed to provide greater temporal resolution; thus samples are collected on a daily basis when precipitation occurs. This greater time resolution enhances researchers' ability to evaluate the effect of emission changes, such as the controls mandated by the federal Clean Air Act, the potential impact of new sources, or source-receptor relationships in atmospheric models.

Unlike NTN samples, AIRMoN samples are kept refrigerated, are not filtered, and are event-based.

Established: October 1992

Measures: Concentration of ammonium, bromide, calcium, chloride, magnesium, nitrate, potassium, orthophosphate, sodium, sulfate, pH, and conductivity in precipitation

Frequency: Event-based

Technology: Precipitation collector and raingage

Bag sampling started: October 2014



August 2019							
Sun	Mon	Tue	Wed	Thu	Fri	Sat	
Submit AMN	et Site Reports A	& B at the end o	1	2	3		
4	5	6 NTN change-out MDN change-out AMoN change-out	7	8	9	10	
11	12	13 NTN change-out MDN change-out	14	15	16	17	
18	19	20 NTN change-out MDN change-out AMoN change-out	21	22	23	24	
25	26	27 NTN change-out MDN change-out	28	29	30	31	

Central Analytical Laboratory (CAL)

The CAL provides site support, sample processing, chemical analysis, and data validation for precipitation and air samples collected at NTN, AIRMON and AMON sites. CAL analyses include specific conductance and hydrogen ion (measured pH), as well as reported chemical concentrations (mass/volume) of sulfate, nitrate, ammonium, ambient ammonia, orthophosphate, chloride, bromide, calcium, magnesium, sodium and potassium.





September 2019

Sun	Mon	Тце	Wed	Thu	Fri	Sat
1	Labor Day CAL and HAL closed	3 NTN change-out MDN change-out AMoN change-out	4	5	6	7
8	9	10 NTN change-out MDN change-out	11	12	13	14
15	16	17 NTN change-out MDN change-out AMoN change-out	18	19	20	21
22	23	24 NTN change-out MDN change-out	25	26	27	28
29	30	Subm	it AMNet Site Re	ports A, B, & C at	the end of the m	ionth.

Mercury Analytical Laboratory (HAL)

The HAL has analyzed wet-deposition samples for NADP since January 1996 for total mercury, and methyl mercury for some sites.

Number of MDN sites in 1996: 30

Number of MDN sites in 2018: 97

Analysis Methods: EPA Method 1631 for total mercury, and EPA Method 1630 for methyl mercury.



MDN sampler



MDN supplies waiting to ship



MDN sample preparation



Analysis for total mercury

					Octol	ber 2019
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 NTN change-out MDN change-out AMoN change-out	2	3	4	5
6	7	8 NTN change-out MDN change-out	9	10	11	12
13	14 Columbus Day	15 NTN change-out MDN change-out AMoN change-out	5 16	17	18	19
20	21	22 NTN change-out MDN change-out	23	24	25	26
27	28	NTN change-out MDN change-out AMoN change-out	30	31 Halloween	Submit AMNet S B at the end of t	ite Reports A & he month.

Other Map Products

Hydrogen ion wet deposition from measurements made at the Central Analytical Laboratory, 2017



Hydrogen ion concentration as pH from measurements made at the Central Analytical Laboratory, 2017







November 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Subr	nit AMNet Site R	1	2			
3 Daylight Saving Time Ends	4	5 Election Day NTN change-out MDN change-out	6	7	8	9
10	11 Veteran's Day	12 NTN change-out MDN change-out AMoN change-out	2 13	14	15	16
17	18	19 NTN change-out MDN change-out	20	21	22	23
24	25	26 NTN change-out MDN change-out AMoN change-out	27	28 Thanksgiving CAL and HAL closed	29	30



UT09: AMoN and NTN site at Canyonlands National Park, Utah



KY10: NTN and MDN sites at Mammoth Cave National Park, Kentucky



TW01: AMNet site on Mt. Lulin in Taiwan



FL23: AMoN and NTN site at Sumatra, Florida

					Decemb	oer 2019
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3 NTN change-out MDN change-out	4	5	6	7
8	9	10 NTN change-out MDN change-out AMoN change-out	11	12	13	14
15	16	17 NTN change-out MDN change-out	18	19	20	21
22	23	24 NTN change-out MDN change-out AMoN change-out Christmas Eve CAL and HAL closed	25 Christmas CAL and HAL closed	26	27	28
29	30	31 NTN change-out MDN change-out New Year's Eve CAL and HAL closed	Submit AMNet S	ite Reports A, B,	& C at the end of	f the month.

NADP Equipment



ETI Instrument Systems, Inc.

1317 Webster Avenue Fort Collins, Colorado 80524 970-484-9393 eti@frii.com www.etisensors.com



Hach Environmental, Inc.

5600 Lindbergh Drive Loveland, Colorado 80539 800-949-3766 sales@hachenvironmental.com



Tekran Instruments Corporation

2707 NE 125th St., Suite 200 Seattle, WA 98125 888-583-5726 <u>lab-air-info@tekran.com</u> www.tekran.com







N-CON Systems Company, Inc.

130 Old Edwards Road Arnoldsville, Georgia 30619 800-932-6266 info@n-con.com www.n-con.com

2020 Calendar

JANUARY									
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JULY											
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JULY

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AUGUST								
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DE	CEM					
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20	21	22	23	24	25	26
27	28	29	30	31		

Vational Atmospheric Deposition Program

The NADP Program Office is located at the Wisconsin State Laboratory of Hygiene, a unit of the University of Wisconsin-Madison. For more information, contact: NADP Program Office, Wisconsin State Laboratory of Hygiene, 465 Henry Mall, University of Wisconsin-Madison, Madison, Wisconsin 53706. E-mail: nadp@slh.wisc.edu, or visit http://nadp.slh.wisc.edu.